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Analyses of Illinois Wild Turkey Habitat and April Foods

Kim D. Price
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ANALYSES OF ILLINOIS WILD TURKEY HABITAT AND APRIL FOODS

(TITLE)

BY

Kim D. Price

B.S. with Teacher's Certification, 1977

Eastern Illinois University

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Master of Science

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

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I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
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BY

Kim D. Price

B.S. with Teacher's Certification, 1977

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ABSTRACT OF A THESIS

Submitted in partial fulfillment of the requirements for the degree of Master of Science of the Graduate School of Eastern Illinois University

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ABSTRACT

A vegetative analysis of turkey habitat was conducted in Alexander, Jackson, Union, and Calhoun Counties, Illinois. From these studies it was determined that turkeys inhabit relatively open stands of timber with agricultural fields and forest clearings in close proximity. Species of Quercus comprise approximately 40% or more of the tree species sampled, with Q. alba, Q. rubra, and Q. velutina being the most dominant. Found growing in association with Quercus are species of Carya, Cornus florida, Acer saccharum, Sassafras albidum, Fraxinus americana, and Ulmus rubra, in varying concentrations. The examination of food habits, determined by crop and gizzard analysis, is a synopsis of five years' collections from turkey hunter check stations from 1975-1979. Acorns were found to comprise about 25% of the diet, with other important mast contributions being Carya nuts and the fruits of Cornus florida. Succulent new growths of grasses and forbs were also found in varying amounts, indicating the diversity of foods consumed. Arisaema triphyllum, Ranunculus abortivus, Toxicodendron radicans, and Zea mays are but a few of the native and cultivated plants utilized. When available, agricultural foods were consumed in large quantities, but were not selected over, or to the exclusion of, native species.

Although it was previously believed that the turkey selected dense woods as desired habitat, the results of this study revealed that they may readily adapt to more open agricultural areas.

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ANALYSES OF ILLINOIS WILD TURKEY HABITAT AND APRIL FOODS

INTRODUCTION

In 1959, with release of wild trapped stock obtained from Mississippi, West Virginia, and Arkansas, the Illinois Department of Conservation (DOC) initiated a restocking program that would successfully restore the Eastern Wild Turkey (Meleagris gallopavo silvestris) to its native range in Illinois (Calhoun, 1966). "The success of this program is best evidenced by the fact that the turkey population was high enough in 1970 in Alexander, Jackson, and Union Counties to warrent the first legal season since their disappearance from the state" (Cottingham, 1974). Pope and Calhoun Counties were opened to hunting in 1972 and 1978, respectively.

Turkey hunter check stations have been maintained by the DOC since the initiation of these gobbler-only seasons. The present study is based on kill location data and analysis of crops and gizzards collected at these stations by personnel from Eastern Illinois University. Kill locations, when plotted on county maps, indicated concentrations of kill sites which further allowed the selection of sections representative of prime turkey habitat. Since a review of available

literature provided no satisfactory techniques of quantitatively measuring turkey habitat, this study submits a potential means of measuring prime turkey habitat by application of accepted field methods. This will provide a basis of comparison for future release location studies, and will reduce the conjecture surrounding this issue. The April foods segment is a continuation of research initiated by David K. Fleenor, while completing post graduate studies at Eastern Illinois University.

MATERIALS AND METHODS

Field study areas were determined by utilizing data collected at hunter check stations during the spring turkey seasons. Data were available for Alexander, Jackson, and Union Counties from 1970-1979, Pope County for 1972-1979, and Calhoun County for 1977-1979. Kill locations were recorded by township, range, and section numbers. Sections with high kill concentrations were selected for subsequent field studies. Three sections in Alexander, Calhoun, and Union Counties, and two sections of Jackson County were sampled. Pope County was eliminated from the study due to the absence of kill concentrations.

Each study area was divided into twenty sample plots, randomly located approximately fifty meters apart. Each plot was sampled using a 3BAF metric wedge prism (Dilworth and Bell, 1976). The total number of individuals of each tree species

in each plot was recorded. The basal area (m^2/ha), relative dominance, and relative frequency for each tree species was determined using the following formulas.

Basal Area (m^2/ha) = Total stems of a species X 0.15

$$\text{Relative Dominance} = \frac{\text{Total individuals of a species}}{\text{Total individuals of all species}} \times 100$$

$$\text{Relative Frequency} = \frac{\text{Total plots of occurrence of a species}}{\text{Total plots of occurrence of all species}} \times 100$$

At every other sample plot a 0.025 ha plot was established. Trees within this plot were recorded by species into 1 dm d.b.h. diameter classes. From these data, the density (trees/ha), relative density, and density (trees/ha) by diameter classes were determined for each species using the following formulas.

Density per ha = Total stems of a species X 4

$$\text{Relative Density} = \frac{\text{Total individuals of a species}}{\text{Total individuals of all species}} \times 100$$

Density per ha by diameter class = Total individuals of a species in a diameter class X 4

To provide a realistic basis for comparison, the Importance Value (IV) of each tree species was then calculated for each section sampled. As used here the determination of the IV follows the procedure outlined by McIntosh (1959) and later by Boggess (1964) in which the IV is the sum of the

relative density, relative frequency, and relative dominance.

Crops and gizzards for the food analysis were collected in Union, Jackson, and Alexander Counties during the hunting seasons of 1975-1977, and for 1978 and 1979 in Calhoun County. Each specimen, collected at hunter check stations, was preserved in a container of FAA, labeled, and held for analysis.

The contents of the crops and gizzards were analyzed using the standard methods of food analysis (Martin, 1949). Food items were separated, identified using plant nomenclature following Mohlenbrock (1975), and volumetric measurements were made. These measurements were made using 5cc syringes, or with 10cc, 50cc, or 100cc graduated cylinders, depending on the overall size of the food material studied. Food items were then ranked by order of occurrence, based on how many birds (crops and/or gizzards) that it was recorded in, while the percent contribution to volume was also calculated using the following formulas.

$$\text{Percent Occurrence} = \frac{\text{\# of birds the food item was identified in}}{\text{Total \# of all birds sampled that year}} \times 100$$

$$\text{Percent Volume} = \frac{\text{Total weight (cc) of a single food item}}{\text{Total weight (cc) of all food items}} \times 100$$

RESULTS

A total of eleven, one square mile forest sites were examined in Calhoun, Union, Jackson, and Alexander Counties to determine the types of vegetation that wild turkeys commonly utilized. Tables 1,2,3, and 4 list these sites and the common tree species encountered. Also listed in these tables is the basal area, density, relative values, Importance Value, and numbers of trees per hectare by diameter classes.

All of the sites in Tables 1,2,3, and 4, except Area 2 in Jackson County, consisted of upland sites, composed primarily of ridges and ridge tops. Quercus alba was found in all ten, averaging 5.2 m^2/ha basal area, with an Importance Value (IV) from between 23.2 to 102.3, and averaging 64.0. Quercus rubra and Q. velutina were in all sections with Q. alba, and in one section of Calhoun County, Q. muhlenbergii also appeared in association with Q. alba. Liriodendron tulipifera was found to be the extreme dominant in one section of Union County. Hickories were noted in all sections of the uplands, with an IV range of 21.9 to 80.5, and averaging 54.2. These species include Carya ovata (Mill.) K. Koch, C. tomentosa (Poir.) Nutt., C. cordiformis (Wang.) K. Koch, and occasionally C. glabra (Mill.) Sweet. Two species that contributed extensively to the understory were Acer saccharum (IV 10.6-90.6, $\bar{x}$ 32.4), and Cornus florida (IV 9.1-51.9, $\bar{x}$ 29.7). Over 75% of the A. saccharum was recorded in the 1-2 dm

diameter class, while 98% of the C. florida also was in the 1-2 dm size class. The remaining tree species were recorded from one or two sample plots only. Occasionally encountered in the uplands were Magnolia acuminata (IV 8.0), Nyssa sylvatica (IV 11.1), Fagus grandifolia (IV 5.6-13.7), Liriodendron tulipifera (IV 12.5-71.3), Ostrya virginiana (IV 6.8), Ulmus rubra (IV 7.6-15.9), Liquidambar styraciflua L., Prunus serotina Ehrh., and Juglans nigra L. In Calhoun County, other tree species recorded were Morus rubra L., Tilia americana L., and Juglans cinerea L. Acer rubrum was observed in one section of Alexander County.

One section sampled in Jackson County, near the Turkey Bayou Recreation Area, was dominated by lowland species (Area 2, Table 4). Quercus bicolor (IV 53.4) was the dominant tree species in the larger diameter classes. Ulmus americana (IV 47.4) comprised approximately 50% of all trees in the 1-2 dm diameter class, and occupied 1.8 m^2/ha basal area. Liquidambar styraciflua ranked third in IV, with 79% of the species sample in the 1-2 dm size class. Prominent in these bottomlands were Q. shumardii, Q. palustris, Q. pagodaefolia, and Q. macrocarpa. The oaks had a combined relative dominance of 61%, and a total relative density of 35%. Also much in evidence were Carya ovata and C. lacinosa (combined IV 37.4). Other species encountered were Celtis laevigata, Diospyros virginiana L., Gleditsia triacanthos L., Crataegus spp., and Fraxinus spp.

Information on plant foods utilized by the wild turkey in Union, Jackson, and Alexander Counties was collected from 1975, 1976, and 1977 hunting seasons. A total of 103 crops and 118 gizzards were examined from these three counties, and each of the 64 species of native and agricultural food items were ranked by frequency of occurrence. Table 5 contains the 29 plant species most frequently encountered, and includes the contribution to the total volume of each by percent volume.

Acorns occurred in 70% of the samples, accounting for 27% of the total volume. Zea mays was the only food item that contributed more to the total volume (29% or 244.9cc) than acorns, but it occurred in only 15% of the total sample. Arisaema triphyllum ranks third in total volume, occurring in 27% of the samples. Use of A. triphyllum ranged from a high of 82% in Alexander County in 1976, to 41% in Jackson County in 1975, to trace amounts in Jackson County (1977) and Alexander County (1975, 1977).

Ranunculus abortivus was identified in trace amounts for all three years from Union and Alexander Counties, occurring in 22% and 28%, respectively. Jackson County samples contributed 9.6cc in 1976, appearing in 91% of the samples taken. Ranunculus septentrionales was recorded in trace amounts for all years, but one bird, taken in Jackson County (1977), consumed 110cc (80% of the total volume), thus exaggerating the importance of this food source.

Unidentified Graminae and Dicot leaf fragments were recorded in 16% and 22% of the sample, respectively. These labels were applied to green plant parts that were too macerated for more specific identification. Four other plant species were encountered frequently, but contributed less than five percent to the total volume.

Carya nut shell fragments were identified in 14% of the specimens, but only accounted for two percent of the volume. These occurred in a range from 29% in Union County (1976), to 91% in Jackson County (1976), and were not found in any 1977 specimens. Carya was not found in any sample from Alexander County. Nyssa sylvatica contributed seven percent to the volume of Jackson County birds, occurring in 37% of that sample. In total, it was identified in 27% of the specimens, but donated less than five percent to the total volume. Carex artitecta, recorded in 26% of the sample, was isolated mostly in trace amounts, but occurred at a maximum of 2.2cc in 1976 from Union County. Cornus florida was not identified in any Alexander County samples, but was recorded in 23% and 15% of the sample of Jackson and Union Counties, respectively. A total of 53 other plant species were identified in the collected specimens. These contributed less than five percent to the total volume and were recognized in 10% or less of the samples. Species listed in the "others" category in Table 5 include Krigia biflora (Walt.) Blake, Taraxacum officinale Weber., Cyperus ovularis (Michx.) Torr., Glycine max (L.) Merr.,

Elymus hystrix L., Ranunculus recurvatus Poir., Arisaema dracontium (L.) Schott., Viola septentrionales Greene, Stellaria media (L.) Cyrillo, Prunus serotina Ehrh., Elymus villosus Muhl., Corylus americana Walt., Panicum boscii Poir., Celtis laevigata Willd., Acer saccharum Marsh, Polygonum aviculare L., Oxalis violacea L., Poa pratensis L., Corydalis flavula (Raf.) DC., Celtis occidentalis L., Diarrhena americana Beauv., Leersia lenticularis Michx., Ostrya virginiana (Mill.) K. Koch. Krigia oppositifolia Raf., Myosurus minimus L., Medicago lupulina L., Cerastium viscosum L., and Poa annua L.

Twenty four crops and twenty six gizzards were collected from Calhoun County in 1978 and 1979, the results of which may be found in Table 6. Cornus florida was identified in 69% of the sample, but accounted for only two percent of the volume. In 1978, it was recorded in trace amounts in 60% of the specimens, and occurred in 75% of the birds in 1979. Ranked first in volume (56% of the total volume), Zea mays was consumed by three of ten birds in 1978 and by nine of sixteen in 1979. This species comprised 82% of the total volume in 1978, and 41% of the total volume in 1979.

Ranked second in volume and occurrence, acorns appeared in 62% of the samples. Unidentified Graminae and Carya shell fragments both occurred in 54% of the specimens, but composed three and two percent of the volume, respectively. Arisaema

triphyllum was recognized in 31% of the samples, occurring in trace amounts in 1978 to 15% of the total volume in 1979.

Ranked sixth in occurrence, Vitis spp. was isolated in 42% of the sample. This food source was used by seven of ten birds in 1978 and in four of sixteen birds in 1979. Celtis occidentalis contributed five percent to the total volume in 1978, and only as a trace in 1979, with 70% of the 1978 specimens containing this food and only 13% of the 1979 total. A total of 16 other plant species were found in Calhoun County birds, but these species contributed less than 12% to the total volume. Half of that number were identified in only trace amounts, each in one bird only, and were probably consumed by chance during a feeding pass over an area.

Table 7 presents the amount of edge present, and the amounts of forested and open ground (in hectares) recorded for all eleven areas studied.

DISCUSSION

All nine sections of Alexander, Union, and Calhoun Counties, and one section of Jackson County are located in the eastern deciduous oak-hickory forest that dominates southern Illinois. Hendricks (1969) stated that the Shawnee National Forest still contains the physical and biotic conditions suited to the Eastern Wild Turkey. A description of the study area would read very similar to Wheeler's (1948) description of ideal turkey habitat: "a well watered, forested area that

Table 1. Basal area, density, relative values, and diameter classes of the woody vegetation in three forest areas with high turkey concentrations, Calhoun County, Illinois.

SPECIES	Basal Area m^2/ha	Density stems/ha	RELATIVE VALUES				NUMBER OF TREES PER HA BY DIAMETER CLASS (dm)			
			Rel. Freq.	Rel. Den.	Rel. Dom.	I.V.	1-2	2-3	3-4	4+
AREA 1. (Sect. 16 T10S R2W)										
Quercus alba L.	6.5	92	21.4	23.7	35.8	80.9	32	12	36	12
Cornus florida L.	2.3	92	15.7	23.7	12.5	51.9	88	4	--	--
Quercus rubra L.	3.3	28	17.2	7.2	18.3	42.7	12	8	--	8
Fraxinus americana L.	1.7	68	10.0	17.5	9.2	36.7	56	--	8	4
Ulmus rubra Muhl.	0.9	20	5.7	5.2	5.0	15.9	8	8	--	4
Carya spp.	2.0	24	17.1	6.2	10.9	34.2	8	12	4	--
Others	1.7	64	12.9	16.5	8.3	37.7	52	4	4	4
Totals	18.4	388	100.0	100.0	100.0	300.0	256	48	52	32
AREA 2. (Sect. 20 T9S R2W)										
Quercus alba L.	5.6	64	22.2	17.6	29.9	69.7	--	20	36	8
Cornus florida L.	1.5	104	12.5	28.5	8.1	49.1	100	4	--	--
Acer saccharum Marsh.	3.8	44	15.3	12.1	20.2	47.6	28	12	4	--
Quercus rubra L.	3.0	36	18.1	9.9	16.1	44.1	4	8	12	12
Quercus velutina Lam.	0.5	4	4.2	1.1	2.4	7.7	--	--	--	4
Ulmus rubra Muhl.	0.3	12	2.7	3.3	1.6	7.6	8	4	--	--
Carya spp.	2.8	68	13.9	18.7	14.5	47.1	32	16	16	4
Others	1.5	32	11.1	8.8	7.2	27.1	24	8	--	--
Totals	19.0	364	100.0	100.0	100.0	300.0	196	72	68	28
AREA 3. (Sect. 27 T11S R2W)										
Acer saccharum Marsh	6.9	116	22.0	35.4	33.2	90.6	60	28	24	4
Cornus florida L.	1.2	76	7.8	23.2	5.8	36.8	76	--	--	--
Fraxinus americana L.	3.0	28	11.7	8.5	14.4	34.6	4	4	20	--
Quercus rubra L.	2.3	16	14.3	4.9	10.8	30.0	--	4	4	8
Quercus muhlenbergii Engelm.	2.3	28	10.4	8.5	10.8	29.7	4	8	16	--
Quercus alba L.	1.7	20	9.1	6.2	7.9	23.2	--	--	4	16
Carya spp.	1.9	32	9.1	9.7	8.6	27.4	8	4	12	8
Others	2.0	12	15.6	3.6	8.5	27.7	8	4	--	--
Totals	21.3	328	100.0	100.0	100.0	300.0	160	52	80	36

Table 2. Basal area, density, relative values, and diameter classes of the woody vegetation in three forest areas with high turkey concentrations, Union County, Illinois

SPECIES	Basal Area m^2/ha	Density stems/ha	RELATIVE VALUES				NUMBER OF TREES PER HA BY DIAMETER CLASS (dm)			
			Rel. Freq.	Rel. Den.	Rel. Dom.	I.V.	1-2	2-3	3-4	4+
AREA 1. (Sect. 14 T11S R3W)										
Quercus alba L.	5.6	76	22.6	21.6	25.7	69.9	24	20	20	12
Quercus velutina Lam.	5.1	68	17.9	19.3	23.6	60.8	16	20	8	24
Acer saccharum Marsh.	.6	36	4.8	10.2	2.8	17.8	28	--	--	8
Liriodendron tulipifera L.	.9	8	6.0	2.3	4.2	12.5	4	4	--	--
Quercus rubra L.	.9	12	4.8	3.4	4.2	12.4	8	4	--	--
Sassafras albidum (Nutt.) Nees	.3	20	2.4	5.7	1.4	9.5	20	--	--	--
Fraxinus americana L.	.3	12	2.4	3.4	1.4	7.2	4	4	4	--
Carya spp.	6.4	80	28.7	22.7	29.1	80.5	24	40	16	--
Others	1.9	40	10.4	11.4	7.6	29.4	20	12	--	8
Totals	22.0	352	100.0	100.0	100.0	300.0	148	104	48	52
AREA 2. (Sect. 4 T13S R2W)										
Liriodendron tulipifera L.	8.1	76	18.9	25.0	27.4	71.3	12	4	20	40
Quercus rubra L.	5.1	24	16.6	7.9	17.3	41.8	4	8	8	4
Quercus velutina Lam.	3.8	28	12.2	9.2	12.7	34.1	--	4	16	8
Quercus alba L.	3.2	16	11.1	5.3	10.7	27.1	--	--	16	--
Cornus florida L.	.8	32	5.5	10.5	2.5	18.5	32	--	--	--
Sassafras albidum (Nutt) Nees	1.1	24	3.3	7.9	3.6	14.8	24	--	--	--
Nyssa sylvatica Marsh.	.9	8	5.5	2.6	3.0	11.1	4	--	4	--
Carya spp	6.5	92	24.3	30.3	21.8	76.4	24	44	24	--
Others	.4	4	2.6	1.3	1.0	4.9	4	--	--	--
Totals	29.9	304	100.0	100.0	100.0	300.0	104	60	88	52
AREA 3. (Sect. 15 T12S R2W)										
Quercus velutina Lam.	7.9	108	28.1	30.0	39.0	97.1	16	28	16	48
Quercus alba L.	4.4	72	17.2	20.0	21.3	58.5	32	16	20	4
Quercus rubra L.	2.7	16	17.2	4.4	13.2	34.8	4	8	--	4
Acer saccharum Marsh.	.9	56	4.7	15.6	4.4	24.7	48	4	4	--
Fraxinus americana L.	.5	12	3.1	3.3	2.2	8.6	8	--	4	--
Ostrya virginiana (Mill.) Koch	.3	8	3.1	2.2	1.5	6.8	8	--	--	--
Fagus grandifolia Ehrh.	.2	12	1.6	3.3	.7	5.6	4	8	--	--
Carya spp.	3.2	64	21.8	17.8	15.5	55.1	28	16	20	--
Others	.5	12	3.2	3.4	2.2	8.8	4	4	--	4
Totals	20.6	360	100.0	100.0	100.0	300.0	152	84	64	60

Table 3. Basal area, density, relative values, and diameter classes of the woody vegetation in three forest areas with high turkey concentrations, Alexander County, Illinois.

SPECIES	Basal Area m^2/ha	Density stems/ha	RELATIVE VALUES				NUMBER OF TREES PER HA BY DIAMETER CLASS (dm)			
			Rel. Freq.	Rel. Den.	Rel. Dom.	I.V.	1-2	2-3	3-4	4+
AREA 1. (Sect. 14 T14S R2W)										
Quercus alba L.	7.7	112	25.8	35.0	41.5	102.3	28	32	40	12
Quercus velutina Lam.	5.0	48	27.4	15.0	26.8	69.2	--	12	24	12
Quercus rubra L.	1.1	4	8.1	1.3	5.7	15.1	--	4	--	--
Cornus florida L.	.5	24	3.2	7.5	2.5	13.2	24	--	--	--
Sassafras albidum (Nutt.) Nees	.3	20	3.2	6.3	1.6	11.1	16	4	--	--
Acer saccharum Marsh.	.5	16	3.2	5.0	2.4	10.6	16	--	--	--
Carya spp.	3.5	84	27.5	26.4	18.7	72.6	44	32	8	--
Others	.2	12	1.6	3.5	.8	5.9	12	--	--	--
Totals	18.8	320	100.0	100.0	100.0	300.0	140	84	72	24
AREA 2. (Sect. 23 T14S R2W)										
Quercus velutina Lam.	10.2	104	22.7	31.3	42.8	96.8	--	28	40	36
Quercus alba L.	5.6	56	24.2	16.9	23.3	64.4	16	8	28	4
Quercus rubra L.	4.1	48	21.2	14.5	17.0	52.7	8	8	16	16
Acer saccharum Marsh	1.4	44	10.6	13.3	5.7	29.6	44	--	--	--
Sassafras albidum (Nutt.) Nees	.8	8	4.5	2.4	3.1	10.0	8	--	--	--
Cornus florida L.	.3	16	3.0	4.8	1.3	9.1	16	--	--	--
Carya spp.	1.1	28	9.0	8.4	4.5	21.9	20	4	--	4
Others	.7	28	4.8	8.4	2.3	15.5	20	4	4	--
Totals	24.2	332	100.0	100.0	100.0	300.0	132	52	88	60
AREA 3. (Sect. 31 T14S R2W)										
Quercus alba L.	6.9	80	18.4	27.4	30.1	75.9	36	8	16	20
Quercus velutina Lam.	4.4	20	17.4	6.8	19.3	43.5	--	4	8	8
Quercus rubra L.	3.6	28	15.2	9.6	16.0	40.8	--	8	8	12
Sassfras albidum (Nutt.) Nees	.6	36	3.3	12.3	2.7	18.3	24	12	--	--
Acer saccharum Marsh.	.6	32	4.3	11.0	2.7	18.0	32	--	--	--
Fraxinus americana L.	1.1	16	6.5	5.5	4.7	16.7	8	4	4	--
Magnolia acuminata L.	.5	8	3.3	2.7	2.0	8.0	4	--	4	--
Carya spp.	3.7	36	22.8	12.3	16.2	51.3	8	8	8	12
Others	1.6	36	8.8	12.4	6.3	27.5	20	8	--	8
Totals	23.0	292	100.0	100.0	100.0	300.0	132	52	48	60

Table 4. Basal area, density, relative values, and diameter classes of the woody vegetation in two forest areas with high turkey concentrations, Jackson County, Illinois.

SPECIES	Basal Area m^2/ha	Density stems/ha	RELATIVE VALUES				NUMBER OF TREES PER HA BY DIAMETER CLASS (dm)			
			Rel. Freq.	Rel. Den.	Rel. Dom.	I.V.	1-2	2-3	3-4	4+
AREA 1. (Sect. 34 T10S R3W)										
Quercus alba L.	4.8	80	19.7	23.5	24.4	67.6	36	4	12	28
Quercus velutina Lam.	5.3	44	19.7	12.9	26.7	59.3	--	8	16	20
Quercus rubra L.	1.5	24	11.8	7.1	7.6	26.5	12	4	4	4
Acer saccharum Marsh.	.9	32	6.6	9.4	4.6	20.6	24	8	--	--
Fagus grandifolia Ehrh.	.9	12	5.6	3.5	4.6	13.7	8	--	--	4
Fraxinus americana L.	.5	12	3.9	3.5	2.3	9.7	12	--	--	--
Carya spp.	4.8	96	23.6	28.2	23.7	75.5	44	28	24	--
Others	1.3	40	9.1	11.9	6.1	27.1	32	4	4	--
Totals	20.0	340	100.0	100.0	100.0	300.0	168	56	60	56
AREA 2. (Sect. 2 T10S R3W)										
Quercus bicolor Willd.	4.4	68	15.4	16.5	21.5	53.4	12	20	8	28
Ulmus americana L.	1.8	116	10.3	28.2	8.9	47.4	92	12	12	--
Liquidambar styraciflua L.	2.0	56	9.0	13.6	9.6	32.2	44	8	--	4
Quercus shumardii Buckley.	2.6	24	11.5	5.8	12.6	29.9	16	--	--	8
Quercus palustris Muenchh.	2.3	28	10.3	6.8	11.1	28.2	4	--	4	20
Quercus pagodaefolia Ashe.	2.3	8	11.5	1.9	11.1	24.5	--	4	--	4
Carya ovata (Mill.) K. Koch.	1.8	24	9.0	5.8	8.9	23.7	4	8	4	8
Quercus macrocarpa Michx.	.9	16	6.4	3.9	4.4	14.7	8	--	4	4
Carya laciniosa (Michx.)Loud.	.9	12	6.4	2.9	4.4	13.7	8	--	--	4
Fraxinus spp.	.6	20	3.8	4.9	3.0	11.7	8	8	4	--
Celtis laevigata Willd.	.3	20	2.5	4.8	1.6	8.9	20	--	--	--
Others	.7	20	3.9	4.9	2.9	11.7	16	4	--	--
Totals	20.6	412	100.0	100.0	100.0	300.0	232	64	36	80

Table 5. Principle spring foods of the Eastern Wild Turkey in Union, Alexander, and Jackon Counties, Illinois for a three year period (1975-1977), ranked by their frequency of occurrence. Also included is the total volume for each species, the percent of the total volume, and the number of birds in which the species was found. Based on the analysis of 103 crops and 118 gizzards.

SPECIES	UNION CO.				ALEXANDER CO.				JACKSON CO.				TOTALS			
	VOL.		OCC.		VOL.		OCC.		VOL.		OCC.		VOL.		OCC.	
	cc	%	No.	%	cc	%	No.	%	cc	%	No.	%	cc	%	No.	%
Quercus spp.	83.6	17	40	59	50.9	53	28	77	79.5	25	26	87	214.0	24	94	70
Ranunculus abortivus L.	T	--	15	22	.2	--	10	28	9.6	3	14	47	9.8	1	39	29
Arisaema triphyllum (L.) Schott.	45.9	9	16	24	25.6	27	8	22	31.0	10	12	40	102.5	11	36	27
Nyssa sylvatica Marsh.	7.7	2	15	22	T	--	10	28	21.7	7	11	37	29.4	3	36	27
Carex artitecta Mack.	2.9	1	20	29	2.6	3	9	25	T	--	6	20	5.5	1	35	26
Ranunculus septentrionalis Poir.	21.1	4	14	21	.4	--	8	22	115.2	38	9	30	136.7	15	31	23
Dicot leaf fragments	T	--	11	16	T	--	7	19	T	--	12	40	T	--	30	22
Unidentified Gramineae	26.0	5	14	21	6.6	7	3	8	9.0	3	5	17	41.6	5	22	16
Zea mays L.	220.9	45	15	22	3.0	3	3	8	1.0	--	2	7	224.9	25	20	15
Carya spp.	1.4	--	6	9	--	--	--	--	13.0	4	13	43	14.4	2	19	14
Cornus florida L.	1.2	--	10	15	--	--	--	--	T	--	7	23	1.2	1	17	13
Botrychium virginianum (L.) Sw.	4.6	1	8	12	T	--	1	3	4.6	1	6	20	9.2	1	15	11
Sphenopholis obtusata (Michx.) Scribn.	13.3	3	8	12	T	--	2	6	T	--	1	3	13.3	1	11	8
Toxicodendron radicans (L.) Kunth.	1.2	--	4	6	T	--	1	3	1.2	--	6	20	2.4	--	11	8
Smilax hispida Muhl.	T	--	2	3	T	--	3	8	T	--	5	17	T	--	10	7
Vitis spp.	T	--	6	9	T	--	4	11	--	--	--	--	T	--	10	7
Chaerophyllum procumbens (L.) Crantz.	16.8	3	3	4	2.2	2	2	6	9.0	3	3	10	28.0	3	8	6
Trifolium pratense L.	13.2	3	3	4	.3	--	5	14	--	--	--	--	13.5	1	8	6
Claytonia virginica L.	T	--	5	7	--	--	--	--	--	--	--	--	T	--	5	4
Festuca pratensis Huds.	17.0	3	2	3	2.0	2	1	3	8.0	2	2	7	27.0	3	5	4
Rosa spp.	T	--	1	1	--	--	--	--	.2	--	4	13	.2	--	5	4
Cystopteris fragilis (L.) Bernh.	T	--	1	1	1.4	1	4	11	--	--	--	--	1.4	--	5	4
Trifolium repens L.	--	--	--	--	.2	--	4	11	5.5	2	1	3	5.7	1	5	4
Dioscorea villosa L.	--	--	--	--	--	--	--	--	1.2	--	4	13	1.2	--	4	3
Carex hirtifolia Mack.	T	--	3	4	--	--	--	--	--	--	--	--	T	--	3	2
Carex retroflexa Muhl.	T	--	2	3	--	--	--	--	T	--	1	3	T	--	3	2
Alopecurus carolinianus Walt.	T	--	2	3	--	--	--	--	T	--	1	3	T	--	3	2
Elymus virginicus L.	1.2	--	1	1	T	--	1	3	T	--	1	3	1.2	--	3	2
Ampelopsis cordata Michx.	T	--	1	1	--	--	--	--	T	--	2	7	T	--	3	2
Others (see text for other species)	9.0	4	--	--	.2	2	--	--	13.0	2	--	--	22.2	2	--	--
Totals	487.0	100			95.6	100			322.7	100			905.3	100		

Table 6. Principle spring foods of the Eastern Wild Turkey in Calhoun County, Illinois for a two year period (1978-1979), ranked by their frequency of occurrence. Also included is the total volume found for each species, the percent of the total volume, and the number of birds in which the species was found. Based on the analysis of 24 crops and 26 gizzards.

SPECIES	1978				1979				TOTALS			
	VOL.		OCC.		VOL.		OCC.		VOL.		OCC.	
	cc	%	No.	%	cc	%	No.	%	cc	%	No.	%
Cornus florida L.	T	--	6	60	2.5	3	12	75	2.5	2	18	69
Quercus spp.	3.6	10	8	80	9.0	14	8	50	12.6	12	16	62
Unidentified Gramineae	T	--	7	70	3.5	5	7	44	3.5	3	14	54
Carya spp.	1.3	3	7	70	1.0	2	7	44	2.3	2	14	54
Zea mays L.	30.8	82	3	30	27.0	40	9	56	57.8	56	12	46
Vitis spp.	T	--	7	70	1.0	2	4	25	1.0	1	11	42
Celtis occidentalis L.	2.0	5	7	70	T	--	2	13	2.0	2	9	35
Arisaema triphyllum (L.) Schott.	T	--	2	20	10.0	15	6	38	10.0	10	8	31
Smilax hispida Muhl.	T	--	3	30	T	--	4	25	T	--	7	27
Claytonia virginica L.	T	--	4	40	T	--	2	13	T	--	6	23
Ranunculs abortivus L.	T	--	2	20	7.0	11	2	13	7.0	7	4	15
Nyssa sylvatica Marsh.	T	--	1	10	T	--	2	13	T	--	3	12
Trifolium repens L.	T	--	1	10	5.0	8	1	6	5.0	5	2	8
Corydalis spp.	T	--	2	20	--	--	--	--	T	--	2	8
Prunus serotina Ehrh.	T	--	2	20	--	--	--	--	T	--	2	8
Ranunculus septentrionalis Poir.	--	--	--	--	T	--	2	13	T	--	2	8
Dicot leaf fragments	T	--	1	10	--	--	--	--	T	--	1	4
Polygonatum commutatum (Schult.) A.Dietr.	T	--	1	10	--	--	--	--	T	--	1	4
Lespedeza stipulacea Maxim.	T	--	1	10	--	--	--	--	T	--	1	4
Myosurus minimus L.	T	--	1	10	--	--	--	--	T	--	1	4
Panicum spp.	--	--	--	--	T	--	1	6	T	--	1	4
Triticum aestivum L.	--	--	--	--	T	--	1	6	T	--	1	4
Capsella bursa-pastoris (L.) Medic.	--	--	--	--	T	--	1	6	T	--	1	4
Carex spp.	T	--	1	10	--	--	--	--	T	--	1	4
Totals	37.7	100			66.0	100			103.7	100		

Table 7. Miles of roads, miles of edge, number of dwellings, hectares of woods, hectares of open ground, and hectares of orchards in the four counties in southern Illinois with high turkey concentrations.

Study Area	Miles of roads	Miles of edge	Number of dwellings	Ha of woods	Ha of open ground	Ha of orchards
Alexander County						
T14S R2W Sect. 31	1.25	22.8	1	1307.3	267.8	--
T14S R2W Sect. 23	1.25	2.5	-	1515.8	63.2	--
T14S R2W Sect. 14	0.75	1.5	-	1547.4	31.6	--
Calhoun County						
T10S R2W Sect. 16	1.75	47.6	8	994.8	489.5	94.7
T9S R2W Sect. 20	2.0	70.8	4	994.8	457.9	110.5
T11S R2W Sect. 27	1.2	26.0	3	1275.8	267.8	31.5
Jackson County						
T10S R3W Sect. 34	1.0	2.8	10	1548.4	31.6	--
T10S R3W Sect. 2	0.5	3.5	-	1501.0	79.0	--
Union County						
T11S R3W Sect. 14	0.75	1.5	1	1453.6	126.4	--
T13S R2W Sect. 4	--	0.6	-	1516.8	63.2	--
T12S R2W Sect. 15	1.1	6.0	8	1169.2	410.8	--

is composed of a variety of timber types of which fifty percent is hardwood (one half of which is oak), that is broken by well dispersed forest clearings that support rank growths of native grasses, legumes, and plants producing succulent fruits."

The present study suggests that the best upland forest habitat is one in which Quercus spp. is the dominant. Quercus alba was the species found most dominant with Q. rubra and Q. velutina found in association with Q. alba in all sections. Various species of Carya, including C. ovata, C. tomentosa, C. cordiformis, and C. glabra, accounted for a majority of trees sampled in the 2-3 and 3-4 dm diameter classes. The understory of this habitat contains Acer saccharum (on the moister slopes), and usually with Cornus florida and Sassafras albidum as important components. In all sections, agricultural fields and forest clearings were in proximity. These canopy openings provide food plants, breeding territories, nesting and brooding areas, and loafing grounds (Holbrook and Lewis, 1967). The increased edge effect created by the interspersion of forest and agricultural fields allows the intrusion of potential food plants into the mature forested areas. Lindzey (1967) noted that the birds prefer situations at the forest edge where suitable forest habitat is at hand. Originally it was thought that the only acceptable turkey habitat was large unbroken tracts of mature timber, but now the birds

are "found in a variety of situations from virgin timber to late sapling hardwoods and even in woodlots" (Dellinger, 1967). Loomis (1978) stated that wild turkeys are capable of surviving on relatively small tracts of timber if these woodlots are connected by narrow strips of woods or brushy draws not more than one fourth of a mile long.

The wild turkey also inhabits lowland sites in southern Illinois. One of these sites, located near the Turkey Bayou Recreation Area, was dominated in the larger size class by Quercus bicolor, with an IV of 53.4. Other associated lowland species of Quercus included Q. shumardii, Q. palustris, Q. pagodaefolia, and Q. macrocarpa. The understory was dominated by Ulmus americana, which ranked second in IV, and accounted for 50% of all trees in the 1-2 dm diameter class. Seventy nine percent of the Liquidambar styraciflua sample was recorded in this size class also.

It was originally presumed that large tracts of timber with little or no human interference were required for turkey habitat, but Lindzey (1967) noted that this criterion has been modified as the turkey is returned to its original range. Birds in Iowa, New York, Pennsylvania, Texas, and here in Illinois, have been reported in relatively close association with humans in farming and ranching situations. Truly wild turkeys, however, seem to thrive in areas with minimal human contact (Lindzey, 1967). Results of this study revealed that

they may readily adapt to more open agricultural areas with the associated increased edge effect.

The food habit analysis is a synopsis of three years' collections of crops and gizzards in Alexander, Jackson, and Union Counties (1975-1977), and two years' collections in Calhoun County (1978-1979). Although crops are prefered for analysis because the food item contents are readily identifiable, and are in the original proportions as consumed (Martin, Zim, and Nelson, 1951), gizzard contents were also considered. Rates of digestion were not considered in this study, and data from all crops and gizzards were combined, following the technique outlined by Korschgen (1973). For purposes of a foods checklist, this combination provides a maximum opportunity for a plant species to be identified in the sample.

A total of 68 plant species were identified in the collected specimens, indicating the diversity of foods utilized by the turkey (Tables 5 and 6). Korschgen (1967) recognized this diversity as essential to the bird's survival because of the "fluctuation in the available food supply from season to season and from year to year". However, variety was found not only in the plant species utilized, but also in the plant parts consumed (Korschgen, 1967).

Acorns from species of Quercus indigenous to the sample areas prove to supply the most staple food of the turkey. Characteristically, oaks do not produce heavy seed crops each

year, but turkeys apparently survive these fluctuations without hardship (Lindzey, 1967). Of the 103 crops and 118 gizzards collected from Union, Jackson, and Alexander Counties, acorns were identified in 70% of the sample, contributing 27% to the total volume. They occurred from a low of 50% of the samples in Union County in 1977, to a high of 100% in Jackson County in 1976.

Zea mays was the only food item found in larger percentage volume than acorns, but was recorded in only 15% of the samples. Union County birds accounted for 98% of the total corn usage. Of the 68 birds taken from Union County, two birds (both taken in 1977) consumed 60cc and 46cc in their respective crops. These two birds contribute 88% of the corn usage in this county. Korschgen (1973) noted that corn, while selected less frequently than many native foods, is usually taken in larger quantities when eaten. This phenomenon was further recognized by Holbrook and Lewis (1967) who stated that "wild turkeys readily and sometimes spectacularly use many types of plantings when natural food is either not easily available or in short supply". Because of habitat preference, agricultural foods are of less importance to the turkey than to other gallinaceous birds (Korschgen, 1967).

Although mast is consumed in the largest quantities, some succulent plant material is essential in the diet to fulfill physiological needs (Schorger, 1966). This observation is verified by the numbers of herbaceous and woody species consumed.

The quantity of grit in the gizzard seemed to remain relatively constant, and as Korschgen (1967) recognized, this indicates that the amount present is probably subject to the bird's control. One occurrence of interest is that Crinoid stems were recovered from every gizzard collected from Calhoun County. In addition to providing grit for mastication, these stems probably serve as a calcium source to fulfill some physiological need. Schorger (1966) stated that in Missouri, the heaviest turkey populations occur on limestone soils with frequent open-faced hillsides. Areas with soils deficient in calcium tend to support lower populations.

Results of the food analysis indicates that turkeys will consume foods produced at all the varying stages of plant succession. Loomis (1978) noted that it appears that agricultural crops are being utilized more by the turkey as they inhabit areas of less dense forests and more extensive farmland. Agricultural foods are consumed in larger quantities when encountered, but the great diversity in foods consumed, and the isolated instances of massive corn consumption, indicates that native food plants are not neglected or excluded from the diet where corn is available. Simply stated by Schorger (1966), the food eaten depends largely on what is available. We can conclude, as Korschgen (1967) did, that the available food supply governs the size of the area and the locality of the turkey range.

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LITERATURE REVIEW

The disappearance of the Eastern Wild Turkey (Meleagris gallopavo silvestris) from Illinois has been documented by several authors. Loomis (1978) reported that "the last known turkey harvested in Illinois was shot in the southern part of the state in 1903." The destruction of suitable habitat by lumbering, mining, grazing, and farming as well as illegal hunting pressure over a long period of time led to the disappearance of this native bird (Lewis, 1959; Sickels, 1959; Markley, 1967).

In the early 1950's, restocking attempts were made using pen-raised, hybrid, game farm stock. Between 1954 and 1958, the Illinois Department of Conservation released "thousands" of turkeys in southern Illinois (Calhoun, 1966). Some of these wild/domestic hybrids still survive in areas adjoining domestic animal feed lots in Whiteside, Marshall, and Putnam Counties (Loomis, 1978), but these releases were labeled failures (Hendricks, 1969).

Wild turkeys were trapped from Mississippi, West Virginia, and Arkansas and released in Alexander and Jackson Counties between 1959 and 1964 (Calhoun, 1966). Additional releases were made in 1966 (Hendricks, 1969) and in the spring of 1970, ten years after the initial restocking attempts, a "gobbler-only" season was opened in Alexander, Union, and Jackson Counties. In 1972, Pope County was opened, and in 1978,

Calhoun County became the fifth county opened to turkey hunting since the bird's disappearance from the state (Loomis, 1978).

Dellinger (1967) stated that "we know that optimum habitat rarely occurs and that turkeys maintain good populations in areas having varied quantities and quantities of water, clearings, and forests." The birds seem to prefer situations at the forest edge where suitable forest habitat is at hand, but survive under a variety of food and cover conditions (Lindzey, 1967).

Shaw (1959) suggested that the primary ingredient for wild turkey habitat was a great deal of timberland without much interference from humans. Originally, it was thought that the only acceptable turkey habitat was vast unbroken areas of mature open timber, but now birds "are found in a variety of situations from virgin timber to late sapling stage hardwoods and even in woodlots" (Lindzey, 1967). Schorger (1966) theorized that under primitive conditions, trees probably were not essential to turkeys except for roosting. Relying on their keen eyesight for survival, turkeys prefer their range to be open enough to permit its use, but will resort to dense brushy areas or cut over areas for retreat (Lindzey, 1967). Wild turkeys are capable of surviving on relatively small tracts of timber if these wood lands are connected by narrow strips of woods or brushy draw

not more than one fourth of a mile long (Loomis, 1978). Lindzey (1967) found that the criterion of low human occupancy has been modified somewhat as these birds seem to tolerate more interference from humans than was previously believed, though truly wild turkeys seem to thrive in areas with minimal human interference.

Wheeler (1948) submitted that ideal turkey habitat was a "well watered, forested area that is composed of a variety of timber types of which fifty percent is hardwood (one half of which is oak) that is broken by well dispersed forest clearings that support rank growths of native grasses, legumes, and plants producing succulent fruits." These clearings also serve as centers for breeding territories, and provide nesting and brooding areas, as well as ensuring adequate food production (Holbrook and Lewis, 1967). Wild turkeys depend upon these forest opening food plants during much of the year. but in summer months, in pursuit of insects, grass seeds and berries, they may be found in adjoining fields and pastures (Korschgen, 1967). Korschgen (1973) reported that turkeys are basically omniverous, with plants making up ninety percent of their diet, in the form of mast (oak, hickory), fruits (dogwood, grape, cherry, black gum), and greens (grasses, grass-like plants, annual and perennial herbs). Variety is found not only in the plant species selected, but also in the plant parts used (including fruits, seeds, seed heads, roots, tubers, bulbs, stems, buds, leaves, flowers, pods, and

capsules)(Korschgen, 1967).

Variety in diet is essential to the wild turkey because of the variation in the food supply for all game animals from "season to season and from year to year" (Korschgen, 1967). Acorns provide sustenance throughout the year, but these food plants do not characteristically produce heavy seed crops each year (Korschgen, 1967). Such mast is consumed in large quantities when available, but succulent plant material is essential (Schorger, 1966). Korschgen (1973) found that amounts of green forb leaves and plant parts consumed were inversely proportional to the amount of acorns in the spring turkey diets. Although acorns are found to be an important food stuff, the birds survive failure of acorn mast with no apparent hardship (Lindzey, 1967). These fluctuations are not critical to the turkey as low production in one food type usually coincides with high production in another (Korschgen, 1967).

Because of their habitat preference, agricultural crops are generally less important in the turkey diet than to other gallinaceous birds (Korschgen, 1967). However, Holbrook and Lewis (1967) found that "wild turkeys readily and sometimes spectacularly use many types of plantings when natural food is either not easily available or in short supply." Zea mays is eaten in large quantities when encountered while feeding, but it is not selected over natural foods (Korschgen, 1973).

Feeding methods of the wild turkey are of several types, and are often used in combinations during a feeding period. Korschgen (1967) described these methods as whole ingestion (acorns, hickory nuts, corn); picking, stripping, and clipping (grasses, sedges, annual and perennial herbs); and scratching.

Leopold (1933) summarized why certain foods are selected as: 1) seasonal difference, 2) availability or accessibility without undue work or exposure, 3) palatability in kind or condition, 4) current physiological needs, 5) recognition of accustomed foods (size and color of food item), and 6) degree of hunger. Korschgen (1967) determined that the size of area and the locality over which the turkey roams is governed by the available food supply.

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